LUKAS

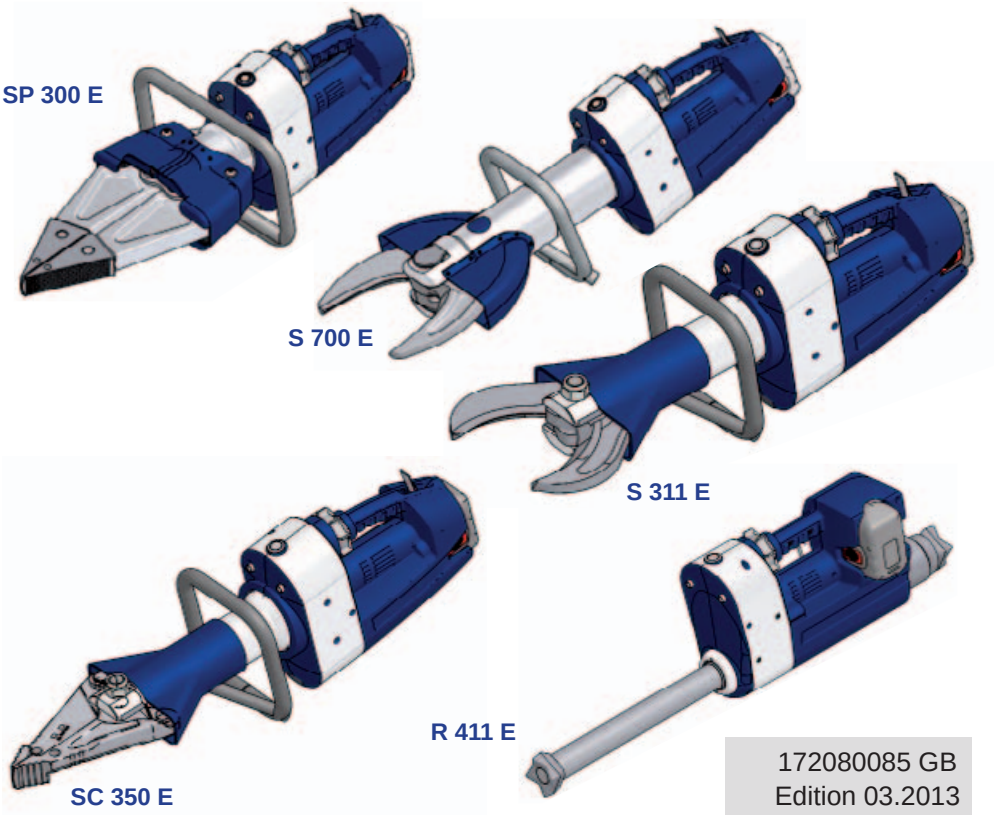
Because you never get a second chance

Operating instructions for rescue equipment

CE

eDRAULIC equipment

(Cutter, combi, spreader and rescue ram)



172080085 GB
Edition 03.2013
replaces 01.2012

(Translation of the original operating instructions)

Contents *Page*

1. Danger classes 4
2. Product safety 5
3. Intended Use 8
4. Functional description 10
   - *4.1 Description* *10*
   - *4.2 Structure of the rescue equipment* *11*
   - *4.3 Hydraulic circuit diagram* *13*
   - *4.4 Controlling the operating movements* *14*
5. Operation 14
   - *5.1 Battery or power supply for eDRAULIC device* *14*
   - *5.2 Operating the star grip* *15*
6. Cutting, spreading, pulling, squeezing and squashing 15
   - *6.1 Safety instructions* *15*
   - *6.2 Cutting* (cutter and combi tool) 16
   - *6.3 Spreading* (spreader and combi tool) 17
   - *6.4 Pulling* (spreader, combi tools) 18
   - *6.5 Squeezing* (spreader, combi tools) 19
   - *6.6 Squashing* (rescue ram) 20
7. Dismantling the equipment / deactivation following operation 21
8. Maintenance and service 21
   - *8.1 Overview of eDRAULIC devices* *22*
   - *8.2 Safety equipment* *23*
9. Repairs 23
   - *9.1 General information* *23*
   - *9.2 Preventive maintenance* *24*
   - *9.3 Repairs* *24*
10. Troubleshooting 36

11. Technical data 38
11.1 eDRAULIC cutter *38*
11.2 eDRAULIC combi tool *39*
11.3 eDRAULIC spreader *40*
11.4 eDRAULIC rescue ram *41*
11.5 Noise emissions (based on the EN ISO 3744 standard) 41
11.6 Operating and storage temperature ranges *42*
11.7 Oscillation / vibration *42*
11.8 Tightening torques for pivot bolts (cutters and combi tools only) *42*
12. EC Declarations of conformity 43
13. Accessories 45
13.1 Batteries *45*
13.2 Battery charger *45*
13.3 Power supply *46*
13.4 Extension for rescue ram *46*
13.5 Chain sets *47*
14. Instructions regarding disposal 47
15. Notes 48

1. Danger classes

We distinguish between various categories of safety instructions. The table below provides an overview of the symbols (pictograms) and signal words assigned to the specific danger and also the possible consequences.

Pictogram	Damage / injury to	Key word	Definition	Consequences
	People	DANGER!	Immediate danger	Death or major injury
		WARNING!	Potentially dangerous situation	Potential death or major injury
		CAUTION!	Less dangerous situation	Minor or slight injury
	Objects	ATTENTION!	Danger of damage to objects / environment	Damage to the equipment, damage to the environment, damage to surrounding materials
	-	NOTE	Advice for application and other important / useful information and advice	No injury / damage to persons / environment / equipment

Wear a helmet with a face guard

Wear protective gloves

Wear safety shoes

Proper recycling

Observe principles of environmental protection

Read and observe operating instructions

2. Product safety

LUKAS products are developed and manufactured to guarantee the best performance and quality when used properly.
Operator safety is the most important aspect of the product design. Moreover, the operating instructions are intended to aid the safe use of LUKAS products.
The generally applicable legal and other binding regulations pertaining to the prevention of accidents and protection of the environment apply and are to be complied with in addition to the operating instructions.
The device may only be operated by persons with appropriate training in the safety aspects of such equipment – otherwise, there is a danger of injury occurring.
We would like to point out to all users that they should read the operating instructions carefully before using the equipment and fully comply with the instructions therein.
We further recommend you have a qualified trainer show you how to use the product.

WARNING / CAUTION!
The operating instructions for accessories must also be taken into account!

Even if you have already received instruction, you should read the following safety instructions again.

WARNING / CAUTION!
Please ensure that the accessories you use are appropriate for the maximum operating pressure and the performance of the rescue device!

	Please ensure that no body parts or clothing are caught between the visible moving parts (e.g. blade arms).	Working under suspended loads is not permitted if these are supported only using hydraulic or electro-hydraulic devices. If this work is unavoidable, suitable mechanical supports are also required.	
	Wear protective clothing, a safety helmet with visor, protective footwear and gloves.	Inspect the device before and after use for visible defects or damage.	
	The department responsible must be informed immediately of any apparent changes (including the operating behaviour). If necessary, the equipment is to be deactivated immediately and secured!	All screwed connections must be checked for leaks and visible damage, which must be repaired immediately! Squirting hydraulic fluid can result in injuries and fires.	

	In the event of malfunctions, shut down the device immediately and make it safe. Repair the fault immediately.	Do not carry out any changes (additions or conversions) to the equipment without obtaining the approval of LUKAS beforehand.	
	Observe all safety and danger information on the device and in the operating instructions.	All safety and danger information on the device must always be complete and in a legible condition.	
	Any mode of operation which compromises the safety and/ or stability of the device is forbidden!	Repairs to the device may only be carried out by trained service technicians with specific knowledge of the device.	
	Safety equipment must never be disabled!	Use only original LUKAS accessories and spare parts when carrying out repairs.	
	Make sure before switching on/starting up the device and during its operation, that this will put no one in danger.	Observe all intervals for recurring tests and/ or inspections that are prescribed or stated in the operating instructions.	
	When working in the vicinity of live components and cables, appropriate measures must be taken to avoid a transfer of current or high-voltage arcing to the device.	Please note that material could fall down or suddenly break free during spreading, cutting, squeezing and squashing operations as a result of shearing, tearing or breaking; appropriate countermeasures must	
	Please ensure that you do not become entangled in cables and trip when working with or transporting the device.	Please ensure that the battery contacts are not short-circuited.	
	The build-up of static charge and therefore possible sparking must be avoided when handling the device.	Only touch any broken-off parts or the cut-off parts wearing protective gloves, since the torn / cut edges can be very sharp.	

	Protect the eDRAULIC devices against humidity and moisture	The eDRAULIC devices are not suitable for underwater use.	
	The equipment is filled with hydraulic fluid. These hydraulic fluids can be dangerous to health if swallowed or their vapours inhaled. Direct contact with the skin is to be avoided for the same reason. Please also note that hydraulic liquids can also have a negative effect on biological systems.	When working with or storing the equipment, ensure that the function and the safety of the equipment are not impaired by the effects of extreme external temperatures or that the equipment is damaged in any way. Please note that the equipment can also heat up over a long period of use.	
	Ensure adequate lighting when you are working.	Before transporting the equipment, always ensure that the accessories are positioned such that they cannot cause an accident.	
	Always keep these operating instructions within reach where the equipment is used.	Ensure the proper disposal of all removed parts, left-over oil and hydraulic fluid as well as packaging materials!	

The generally applicable, legal and other binding national and international regulations pertaining to the prevention of accidents and protection of the environment apply and are to be implemented in addition to the operating instructions.

WARNING / CAUTION / ATTENTION!

The device is intended **exclusively** for the **purpose stated in the operating instructions (see chapter "Intended Use")**. Any other use is **not in accordance** with its designated use. The manufacturer/supplier cannot be held liable for any damage resulting from such use. The risk of such misuse lies entirely with the user.
Intended Use includes observance of the operating instructions and compliance with the inspection and maintenance conditions.

Never work when you are overtired or intoxicated!

3. Intended Use

LUKAS eDRAULIC devices have been specially designed to rescue or retrieve the bodies of victims of road, rail or aircraft accidents or to be used during rescue operations from buildings. LUKAS eDRAULIC cutters and combi tools are used to free injured persons at accident scenes by cutting through doors, roof beams and hinges. LUKAS eDRAULIC spreaders and combi tools can also be used to free trapped persons by forcing open doors or to move obstacles aside with the aid of a chain set. LUKAS eDRAULIC rescue rams are used to free persons who have become trapped during a car accident when the spreader does not open wide enough, for example by spreading or lifting parts of vehicles. During other catastrophic events, rescue rams and spreaders can also be used to move objects to rescue persons who have been buried or trapped.
Care must be taken that the object to be worked on has been secured using stable supports or by underpinning it.
LUKAS eDRAULIC devices are NOT suitable for underwater use.

WARNING / CAUTION!
Care must be taken that the object to be worked on has been secured using stable supports or by underpinning it.

WARNING / CAUTION / ATTENTION!
The following may not be cut / squeezed:

- **live** cables
- **hardened** parts such as springs, spring steels, steering columns and rollers
- tubes / hoses under gas or liquid pressure,
- compound materials (steel/concrete)
- explosive bodies such as airbag cartridges

The operating pressure set on the rescue device may only be directly changed after consultation with LUKAS. A change in settings may result in damage to property and/or injuries.

LUKAS eDRAULIC devices are not explosion-proof!
When deploying the devices in potentially explosive areas, it must be ensured that:

- it cannot cause an explosion.
- working with the device will not cause an explosion; for example, formation of sparks when cutting an object.

The responsibility for explosion prevention or for ruling out work with an eDRAULIC device rests with the operator of the device or with the person responsible at the place of use.
When working in areas at risk of explosion, all applicable legal, national and international regulations, standards and safety rules for preventing explosions must be observed without exception!

The rescue equipment should not come into contact with acids or alkalis. If this is unavoidable, clean the equipment immediately afterwards with a suitable cleaning agent.

You can order spare parts and accessories for the rescue tools from your authorised LUKAS dealer!

Applications:

4. Functional description

4.1 Description

The cutters and combi tools have been designed in such a way that a hydraulically operated piston activates mechanical joints symmetrically to open or close a set of two opposite blade arms, thus enabling objects to be cut.

The spreaders operate according to a similar principle. They, too, have been designed in such a way that a hydraulically operated piston activates mechanical joints symmetrically to open or close a set of two opposite spreader arms. This movement can then be used to spread open, squeeze or pull open objects.

The rescue rams are double-acting hydraulic cylinders. Extension and retraction takes place hydraulically.

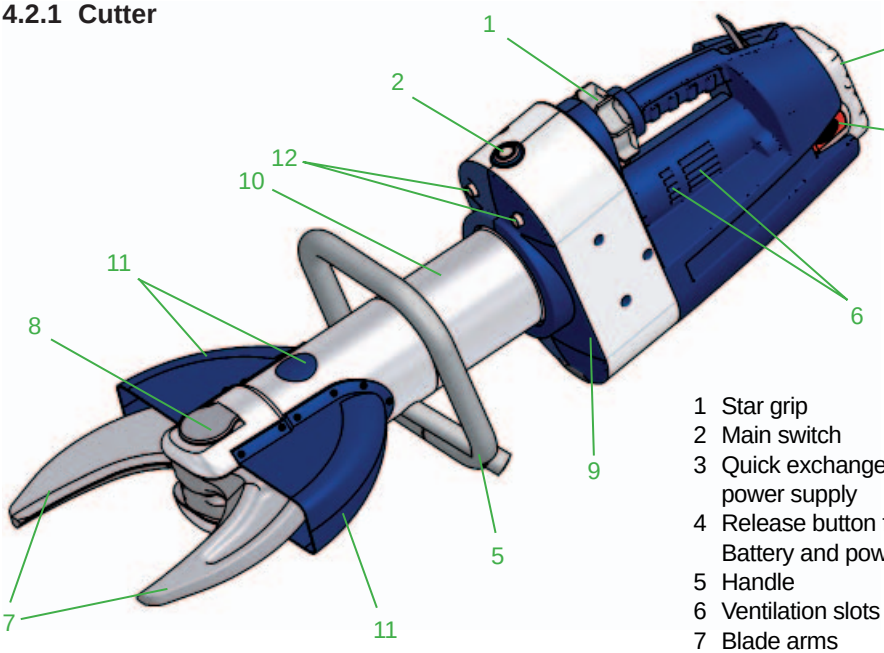
On all devices, the movement is activated by means of a valve in the form of a star grip. All devices guarantee the dead man's switch and the full load-supporting function when the star grip is released.

LUKAS eDRAULIC devices do not need to be connected to an external hydraulic source (e.g. a motor pump). The hydraulic pressure required is generated within the body of the device.
Either a battery or an external power supply must be connected as an energy source.
You can choose which energy source you wish to use. Both the battery and the power unit can be plugged into the opening provided in the body of the tool. Both will lock in place automatically.
When using batteries as an energy source, you have almost unlimited freedom of movement when working, i.e. there are no cables or hoses to hinder you. You can extend the operating time of your eDRAULIC device by using several batteries. The batteries can be recharged after use, using a suitable external charger
If you use an external power supply, the operating time is essentially unlimited; this is only restricted by the external power source and the thermal switch in the power unit.
To allow you to select the best possible energy supply for your eDRAULIC device, neither the battery nor the power supply form part of the delivery scope. You will find suitable batteries and power supplies in the LUKAS accessories list.

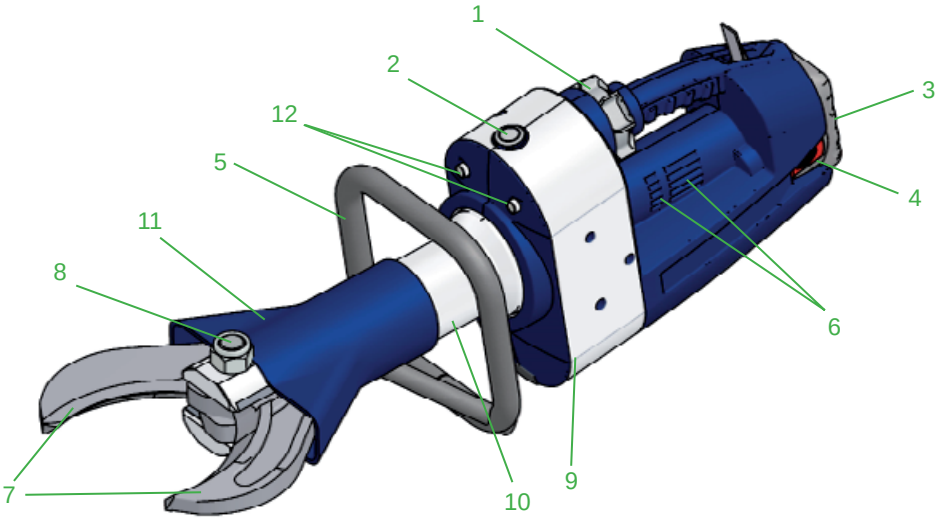
eDRAULIC devices are equipped with lighting as standard so that work can be carried out in conditions where visibility is poor.
The light-emitting diodes attached on the operating side light up the work area. The main switch has also been provided with a light, so that you can see at a glance whether the device is switched on. When exchanging the battery or power supply, the connection slot will be lit up for approximately 30 seconds.

4.2 Structure of the rescue equipment

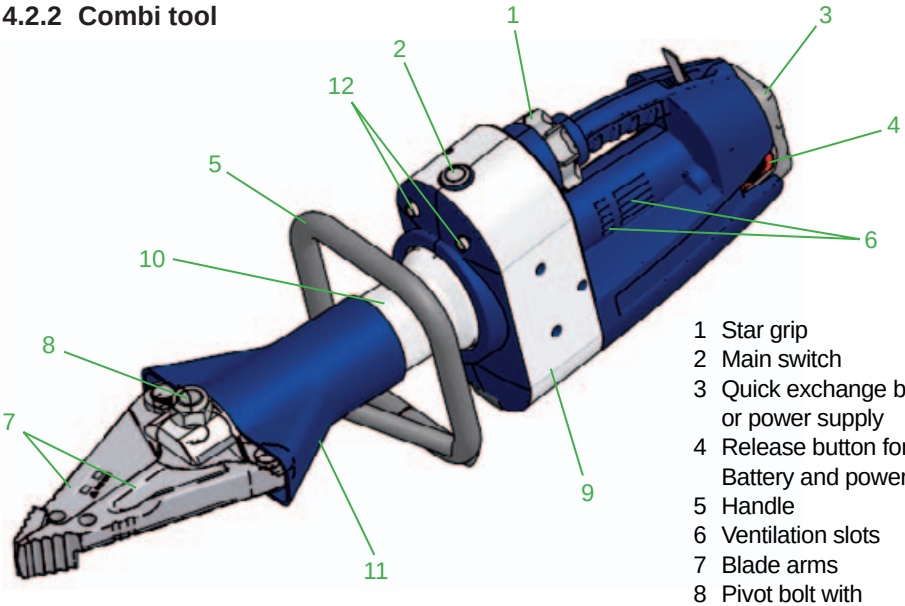
4.2.1 Cutter



1 Star grip
2 Main switch
3 Quick exchange battery or power supply
4 Release button for Battery and power supply
5 Handle
6 Ventilation slots
7 Blade arms
8 Pivot bolt with secured nut
9 Plastic casing
10 Device body
11 Protective cover
12 Illumination

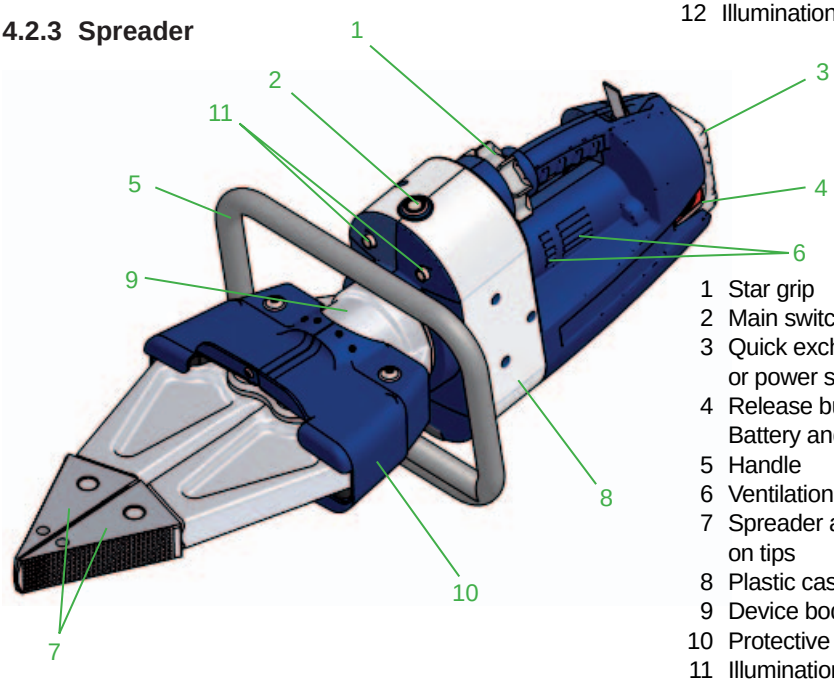


4.2.2 Combi tool



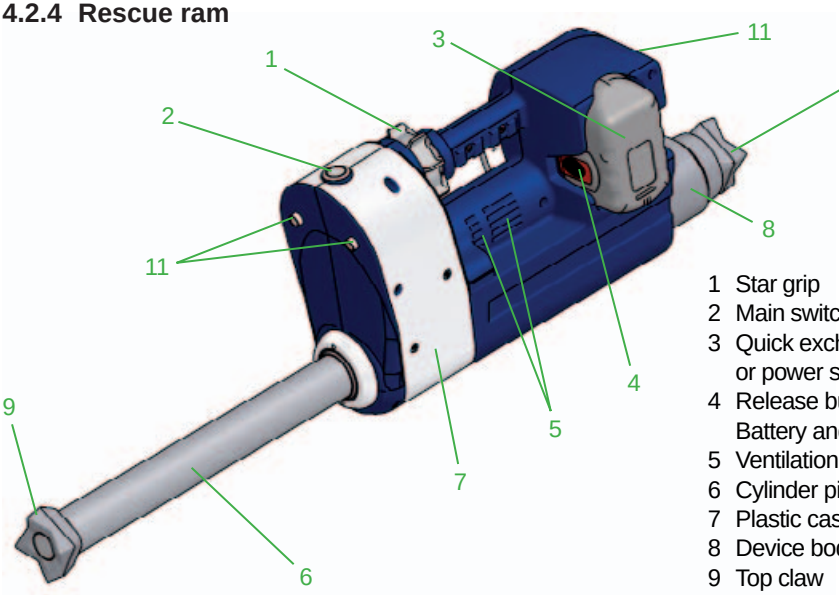
1 Star grip
2 Main switch
3 Quick exchange battery or power supply
4 Release button for Battery and power supply
5 Handle
6 Ventilation slots
7 Blade arms
8 Pivot bolt with secured nut
9 Plastic casing
10 Device body
11 Protective cover
12 Illumination

4.2.3 Spreader



1 Star grip
2 Main switch
3 Quick exchange battery or power supply
4 Release button for Battery and power supply
5 Handle
6 Ventilation slots
7 Spreader arms with plug-on tips
8 Plastic casing
9 Device body
10 Protective cover
11 Illumination

4.2.4 Rescue ram

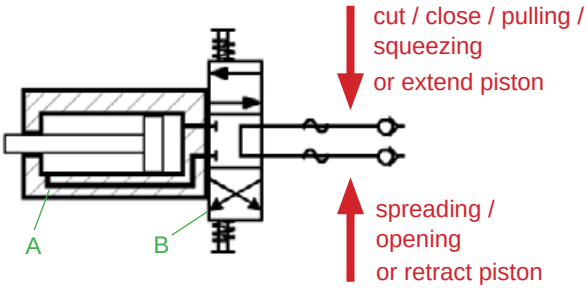


1 Star grip
2 Main switch
3 Quick exchange battery or power supply
4 Release button for Battery and power supply
5 Ventilation slots
6 Cylinder piston
7 Plastic casing
8 Device body
9 Top claw
10 Bottom claw
11 Illumination

NOTE:
When working with the eDRAULIC rescue ram, it should be applied to the object to be processed in such a way that the battery or power supply can be replaced at any time.

4.3 Hydraulic circuit diagram

To enable comprehension of the function, a simplified hydraulic cylinder of the rescue equipment (A) + hand valve (B) are depicted here.



4.4 Controlling the operating movements

The piston movement is controlled by the star grip on the attached valve (see illustration below).

5. Operation

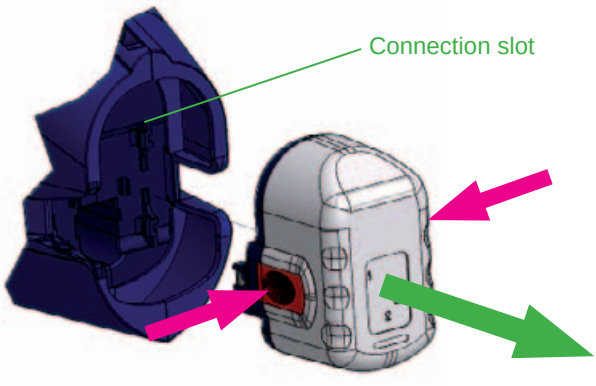
5.1 Battery or power supply for eDRAULIC device

5.1.1 Initial start-up

Before initial operation, the battery (where used) of the rescue device must be fully loaded, using the external charger.

Procedure:

1. Unplug the power supply (where used) from the mains.
2. Fully press down the two unlocking buttons and carefully pull the battery or power supply out of the device.
   Do not use force!



3. The battery can now be recharged in the charger (please take note of the separate operating instructions for the charger and the batteries to be used); alternatively, the power supply can be replaced.
4. Insert the recharged or new battery into the eDRAULIC device until it reaches the stop. The battery or power supply will be automatically locked when correctly operated.

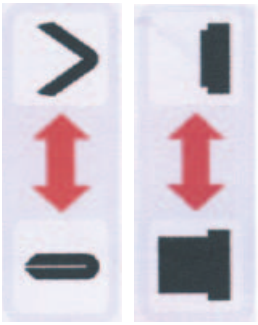
5.2 Operating the star grip
(also see chapter on "Controlling the operating movements")

Open the device or extend the piston (/):

Turn the star grip in the direction of the corresponding symbol (open / extend)and hold it in this position.

Close the device or retract the piston (/):

Turn the star grip in the direction of the corresponding symbol (close / retract)and hold it in this position.



"Dead-man's" function:
Once released, the star grip automatically returns to the central position while fully guaranteeing the load will remain supported.

6. Cutting, spreading, pulling, squeezing and squashing

6.1 Safety instructions

Before rescue work can commence, the position of the accident object must be stabilised. You must ensure that it is adequately underpinned and/or supported.
World-wide, safety guidelines pertaining to the specific country must be observed and complied with. In the Federal Republic of Germany, regular safety inspections according to the legal accident insurance regulations (GUV - **G**esetzliche **U**nfall**v**ersicherung) are mandatory.

WARNING / CAUTION / ATTENTION!
LUKAS eDRAULIC devices are not explosion-proof!
When deploying the devices in potentially explosive areas, it must be ensured that:

- it cannot cause an explosion.
- working with the device will not cause an explosion; for example, formation of sparks when cutting an object.

The responsibility for explosion prevention or for ruling out work with an eDRAULIC device rests with the operator of the device or with the person responsible at the place of use.
When working in areas at risk of explosion, all applicable legal, national and international regulations, standards and safety rules for preventing explosions must be observed without exception!

Wear the following when working with the rescue tool:
- protective clothing,
- safety helmet with visor or protective goggles,
- protective gloves
- and, if necessary, ear protection

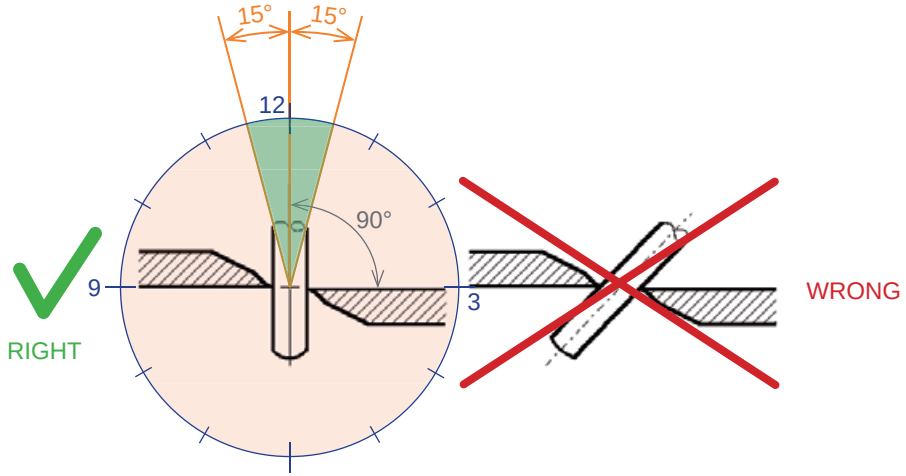
Before operating the rescue tool, you should ensure that its movements or flying fragments will not put participants or bystanders at risk! Further avoid unnecessary damage to property belonging to others, objects not involved by the rescue equipment / flying fragments.

It is strictly prohibited to reach into the path of the rescue device (e.g. between the blades or spreader arms or between the rescue ram and the material to be processed)!

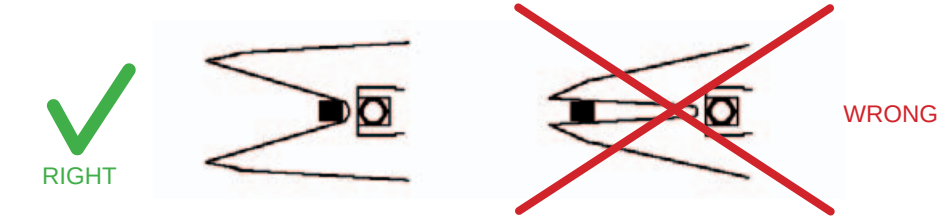
WARNING / CAUTION!
The particular effect of the force of the rescue equipment during operation could cause pieces of the vehicle to break off or fly off, posing a danger to persons. Those not involved in the rescue operation should therefore **keep at a distance appropriate to the situation**. Any trapped or enclosed persons must be protected.

6.2 **Cutting** (cutter and combi tool)

The blades should be positioned at a 90° angle to the object to be cut, if possible.



Higher cutting capacities can be achieved by cutting as close as possible to the blade's pivot point.



During cutting, the gap between the blade tips (in the transverse direction) must not be exceeded, otherwise the blade is in danger of breaking:

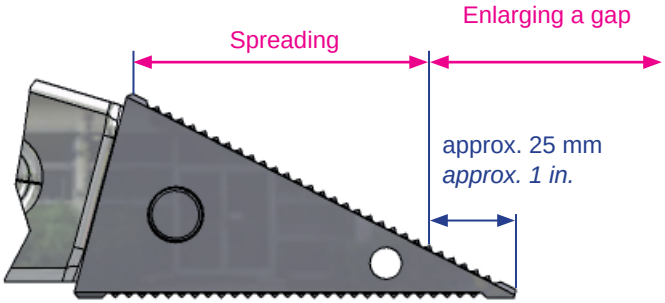
eDraulic tool	max. gap on the blade tips [mm] / *[in.]*
S 311 E	3 / *0.12*
S 700 E	3 / *0.12*
SC 250 E	3 / *0.12*
SC 350 E	3 / *0.12*

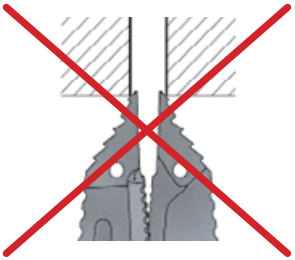
ATTENTION!
Avoid cutting through the hardest parts of the vehicle body (e.g. lateral collision protection), as this may result in damage to the cutters or to more wear and tear!

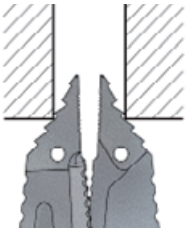
6.3 **Spreading** (spreader and combi tool)

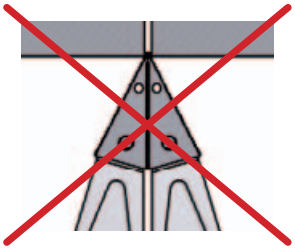
Use the front area of the tips for increasing the gap only. To increase grip and to avoid having the tips slip or break out of the part to be processed, the grip should be reapplied at an early stage. In any case, the highest force is developed in the rear area of the plug-on tip or in the rear spreading area of the combi blades.

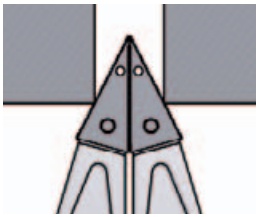
WARNING / CAUTION / ATTENTION!
The light metal alloy spreader arms must not be damaged.

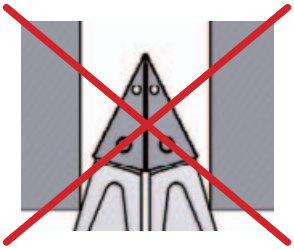












Working surface is too small, tips slip off.
Only for increasing the size of a gap (not suitable for spreading)

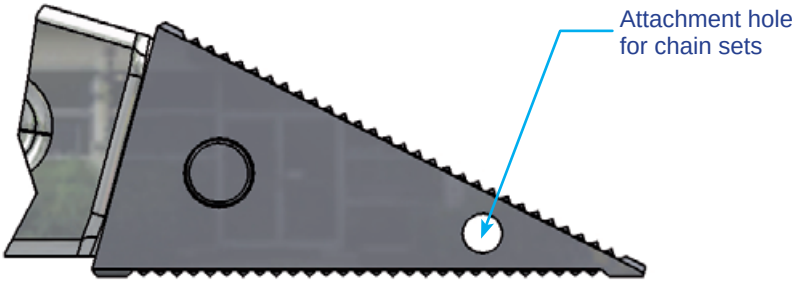
Tips get a safe grip.

Work with the tips only. Do not damage the spreader arms!

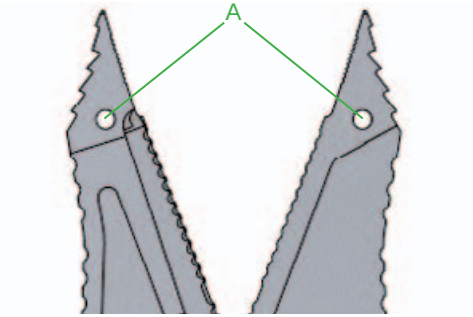
6.4 **Pulling** (spreader, combi tools)

WARNING / CAUTION / ATTENTION!
The light metal alloy arms must not be damaged.

- LUKAS chain sets must be used for pulling.
- When using the traction chain, the pins and hooks must be in the correct position to ensure that the chain cannot slip.
- Only chain sets in perfect condition may be used.
- The traction chains must be checked by an expert at least once a year.
- Also consult the separate operating instructions for the corresponding chain set!



The connection pieces for the LUKAS chain sets are attached to the boreholes A on the blades using load bolts. (see figure on the right).



Chain sets:

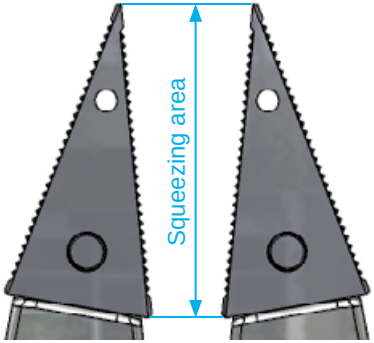
for SC250E: KSV 8/50
for SC350E: KSV 8/50
for SP300E: KSV 11

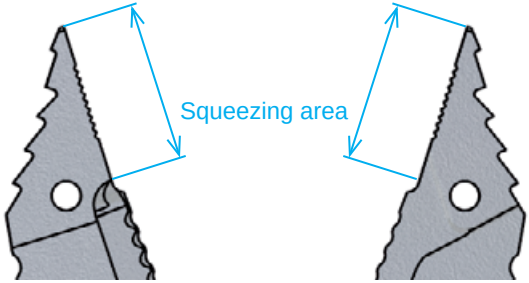
NOTE:
Take note also of all the instructions and regulations in the separately supplied operating instructions for the chain sets.

6.5 **Squeezing** (spreader, combi tools)

WARNING / CAUTION / ATTENTION!
The light metal alloy arms must not be damaged.

Squeezing may only take place near the tips (see figure below).





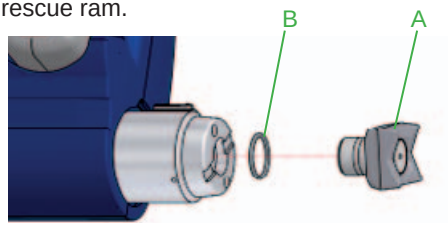
6.6 **Squashing** (rescue ram)

Before you can carry out any work with the rescue ram, you must ensure adequate support. This also includes any necessary substructure. As part of their design, the rescue rams are fitted with claws at the cylinder and piston ends to ensure it is as safe as possible to use. Where this support is not adequate, e.g. when pushing away the front part of the vehicle or when pushing a vehicle upwards, additional supports and ram attachments may be required, and it may need to be secured, using straps for example. You will find suitable support bearings and cylinder attachments in the LUKAS accessories list.

WARNING / CAUTION / ATTENTION!
Never use a rescue ram without a claw or the required accessories! The cylinder could slip during the operation, resulting in injury to the user. In addition, the piston rod or the claw support could be damaged.

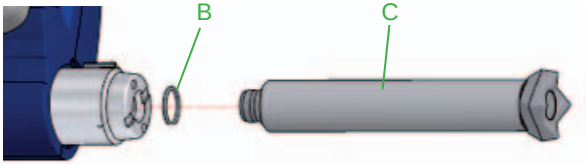
WARNING / CAUTION / ATTENTION!
When applying the rescue ram (without the LUKAS support), care must be taken to ensure that all four tips of both claws, i.e. on the piston and the cylinder side, are in good contact with the object.
When applying the rescue ram (to a LUKAS support), care must be taken to ensure that the surface between the four tips of the claw is in contact with the round bearing rods.
This prevents force from acting on only one end of the cylinder. Objects lifted up must be subsequently secured with firm supports or substructures!

An extension is also available for the eDRAULIC rescue ram.



Procedure for installing the extension:

1. First pull the claw "A" off the cylinder base. Check whether the O-ring "B" is still attached to the cylinder base and is in good condition. Where necessary, replace the O-ring.
2. Check the good fit of the O-ring "B", grease the contact surfaces using LUKAS special grease and insert the extension "C" onto the cylinder base until it reaches the stop.



3. When the extension is no longer required after the operation, remove it by following the instructions in the reverse order and store it in a suitable place.

7. Dismantling the equipment / deactivation following operation

Once work has been completed, the arms should be closed until the tips are only a few millimetres apart or the cylinder piston should be almost fully retracted. This relieves the hydraulic and mechanical strain on the device as a whole.

NOTE:
Never store the eDRAULIC devices with fully closed arms or a fully retracted piston! By fully closing the arms or retracting the cylinder piston, hydraulic and mechanical tension may develop in the device.

Clean the rescue device after each operation and grease both the metallic and the mechanically movable parts. The locking mechanism for the spreader plug-in tips should also be oiled now and again.
Greasing provides protection against excessive wear and tear or corrosion.
Avoid storing the rescue equipment in a damp environment.

8. Maintenance and service

The devices are subject to very high mechanical stresses. A visual inspection must therefore be carried out after every use and at least one visual inspection must be carried out every six months. These inspections enable the early detection of wear and tear, which means that punctual replacement of this wearing parts prevents breakages from occurring. Regularly check the torque of the pivot bolt on the cutters and combi tools. (You will find the tightening torques for the pivot bolt in the chapter "Technical data")
An annual inspection of the tool is due once per year. This inspection must be performed by a person with the necessary expertise. This means that the person must possess adequate specialist knowledge and experience in the fields of electrical engineering and hydraulics, so that they can objectively assess the condition of the tool.
Every three years a crack test of the blades is also essential. A special crack testing kit is available for this.
A functional test must also be performed every three years or if there is any doubt regarding the safety or reliability of the equipment (please also observe the applicable national and international regulations pertaining to service intervals of rescue tools). In the Federal Republic of Germany, regular safety inspections according to the legal accident insurance regulations (GUV - **G**esetzliche **U**nfall**v**ersicherung) are mandatory.

ATTENTION!
Clean off any dirt before checking the device!

WARNING / CAUTION / ATTENTION!
In order to carry out maintenance and repair work, tools appropriate for the job and personal protection equipment must be used.
The maintenance and repair staff must have adequate technical and specialised knowledge. LUKAS offers appropriate training courses for this.

8.1 Overview of eDRAULIC devices

Inspections to be carried out:

Visual inspection

Cutter and combi tool

- Opening width of the blade arms on the tips (see chapter "Technical data"),
- General tightness (leaks),
- Ease of movement of star handle,
- Existence and stability of handle,
- Labels completely existent and legibly,
- Covers in perfect condition,
- Check the tightening torque of the pivot bolt (tightening torque M_A see "Technical data").
- Blade arms free of cracks and cutting surfaces without nicks or deformations,
- Cutting surfaces go on top of each other without making contact,
- The sliding plates, bolts and retaining rings of the blade arms are in place and in good condition,
- Illumination of main switch, work area and connection slot fully functional.

Spreader

- Opening width of arms at the tips (see chapter on "Technical Data"),
- General tightness (leaks),
- Ease of movement of star handle,
- Existence and stability of handle,
- Labels completely existent and legibly,
- Covers in perfect condition,
- Spreader arms not cracked,
- Bolts and retaining rings of spreader arms in place and in good condition,
- The corrugations on the tips should be clean and square, without cracks
- The tips must be in place and locked
- Illumination of main switch, work area and connection slot fully functional.

Rescue ram

- Piston can be extended to its full length (see chapter on "Technical Data"),
- Cylinder and piston rod undamaged and not deformed,
- Claws correctly and securely fitted,
- Claws can be turned and are undamaged (no break-outs),
- General tightness (leaks),
- Ease of movement of star handle,
- Labels completely existent and legibly,
- Illumination of main switch, work area and connection slot fully functional.

Battery and power supply
- Casing undamaged,
- Electrical contact surfaces clean and undamaged
- Cable undamaged
- Battery(-ies) fully charged (when used)
- Charging state display of lithium/ion battery(-ies) fully functional

Functional check
- Easy opening and closing or extension/retraction of star grip controls,
- no suspicious noises.
- no further movement of cutter and spreader arms or cylinder piston when interrupting the valve function during the process (dead man's switch),

8.2 Safety equipment

- Check of the protective equipment on / around the rescue equipment, especially the hand guard for the moveable parts (this must be free of cracks!).

9. Repairs

9.1 General information

Servicing may only be carried out by the manufacturer or personnel trained by the manufacturer and by authorised LUKAS dealers.
Only LUKAS spare parts may be used to replace all components (see spare parts list) since special tools and compliance with assembly instructions, safety aspects and inspections must be taken into account (see also chapter "Maintenance and Servicing").
During assembly, make especially sure that all components are clean, since dirt can damage the rescue tool!

WARNING / CAUTION / ATTENTION!
Protective clothes must be worn when repairs are being carried out, since the devices may also be pressurised when not in operation.

NOTE:
Always register your tool on the LUKAS Hydraulik GmbH internet site. Only then are you entitled to the extended guarantee.

ATTENTION!
Because LUKAS rescue tools are designed to deliver outstanding performance, components must only be replaced with those that are listed in the spare parts lists for the corresponding device.
Other components in the device may only be replaced if:
- you have participated in an appropriate LUKAS service training course.
- you have the express permission of LUKAS Customer Service (valid LUKAS certificate necessary!)

ATTENTION!
When cleaning the equipment, take care not to use any cleaning agent with a pH value outside the range 5 - 8!

9.2 Preventive maintenance

9.2.1 Care instructions

From time to time, the outside of the device should be cleaned with a damp cloth (**not the electrical contacts in the connection slot, the battery or on the power supply**) and oil should be applied to the metallic surfaces (**not the electrical contacts in the connection slot, on the battery or on the power supply**) to prevent corrosion.
(In case of doubt, contact your authorised LUKAS dealer or LUKAS directly!)

9.2.2 Functional and stress test

If there is any doubt regarding the safety or reliability of the equipment, a function and stress test must also be performed.
LUKAS offers appropriate testing equipment for this.

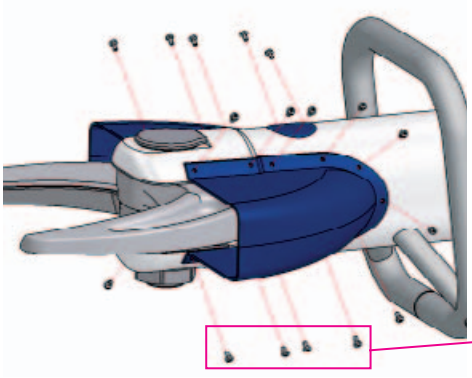
9.3 Repairs

9.3.1 Blades, protective cover and handle replacement for the S700E cutter

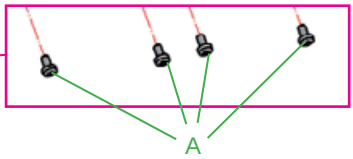
Components to be replaced	***Required work steps***
Protective cover	1., 2. and 7.
Pivot bolt	1. - 4. and 7.
Handle	1. - 5. and 7.
Blade	1. - 6. and 7.

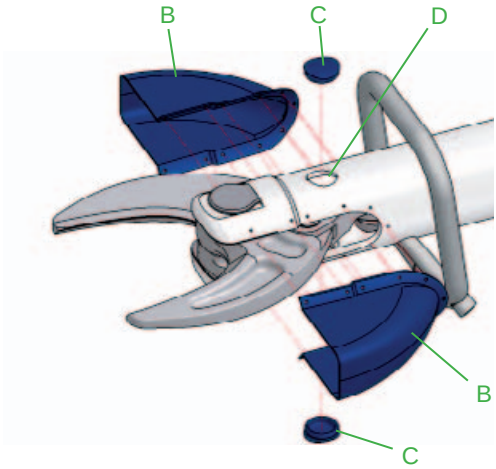
Work steps:

1. First of all, carefully clean the rescue equipment.

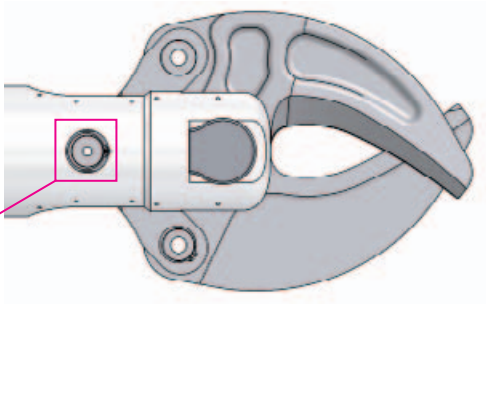


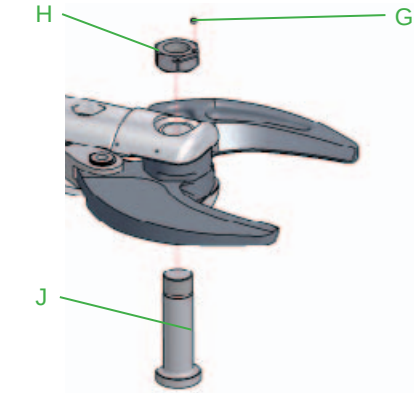
2. Remove the fixing screws "A" and remove the protective cover "B" and the cover caps "C".



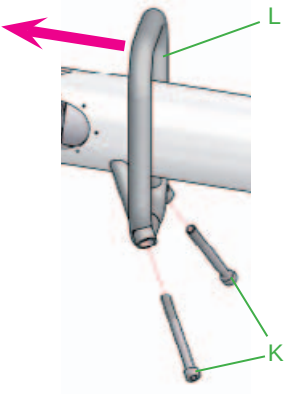


3. Move the blade arms on the unit until the pin "E" and the retaining rings "F" can be accessed through the hole "D".
   Now switch off the device and remove the battery or unplug the power supply from the device.

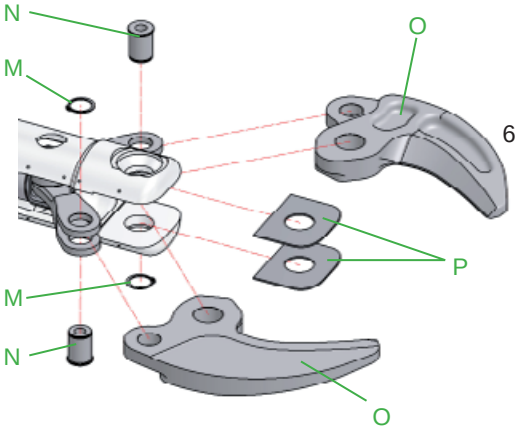




4. First remove the grub screw "G", then the central bolt nut "H" and then pull out the central pin "J".



5. Release the fixing screws "K" and remove them. The handle "L" can now be pulled out forwards over the blades.



6. Remove the retaining rings "M" and push the pin "N" out. You can then pull out the blades "O" and the slide plates "P"

7. The work steps must be carried out in reverse order to fit the new parts.

ATTENTION!
Don't forget to apply LUKAS special grease to all sliding surfaces.

NOTE:
The torque required can be taken from the spare parts list of your particular unit.

9.3.2 Changing the blades, protective cover and handle on the S311E cutter and on the SC350E and SC250E combi tools

NOTE:
The illustrations show the equipment with the blade arms of the cutter. Assembly and disassembly are identical for the combi tool!

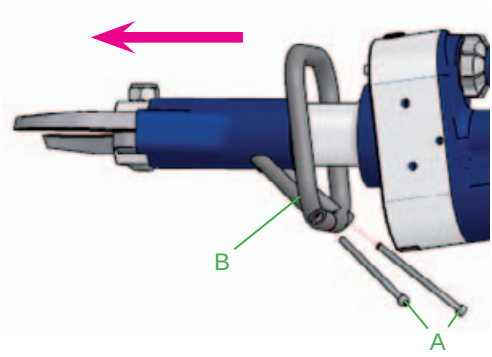
Components to be replaced	***Required work steps***
Protective cover	1. - 9. and 10.
Pivot bolt	1., 5. and 10.
Handle	1. - 3. and 10.
Blade	1. - 7. and 10.

Work steps:

1. First of all, carefully clean the rescue equipment.
2. Next, close the blade arms so that the tips are almost touching.

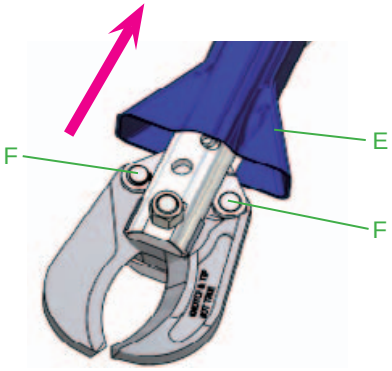
NOTE:
The blade bolts are only accessible when the blade arms are almost touching

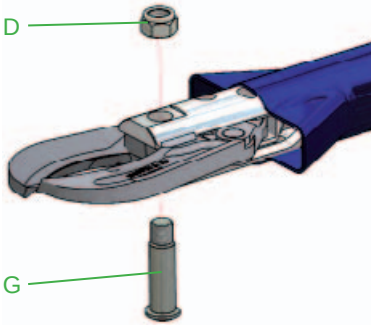
Further procedure:



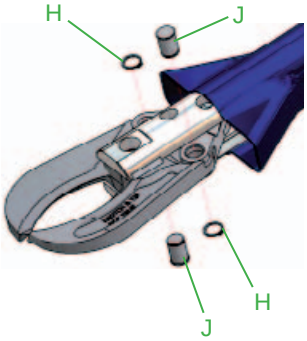
3. Remove screws "A" from handle "B". The handle can then be removed.

4. Push the hand guard E in the depicted direction until the safety bolts F are easily accessible.

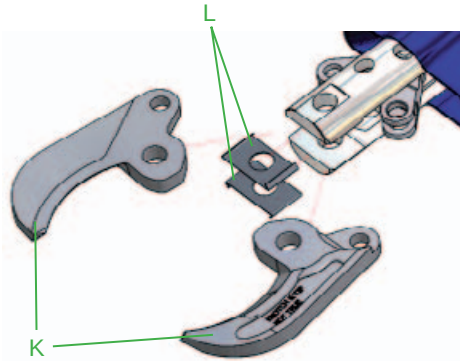




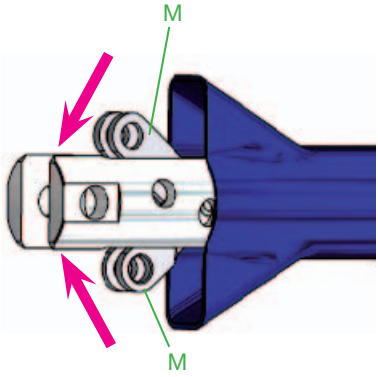
5. Remove self-locking nut D and push the pivot bolt G out.



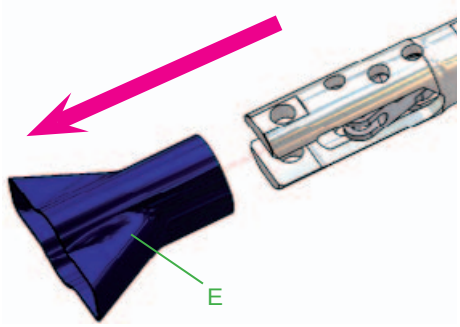
6. Remove the retaining rings H and push out bolt J.



7. Now, you can remove blade K and sliding plates L.



8. Fold in the lever elements M.



9. Finally, pull the hand guard "E" off the device as shown.

10. The work steps must be carried out in reverse order to fit the new parts.

ATTENTION!
Don't forget to apply LUKAS special grease to all sliding surfaces.

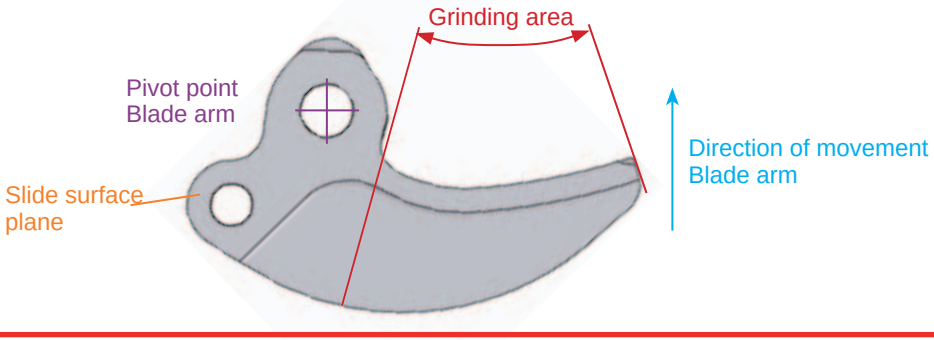
ATTENTION!
The nut of the pivot bolt and the pivot bolt itself are matched by a special procedure. Therefore they must only be changed as a set by using a new set! Owing to the special method used, any loosening of the nut while working will be minimised thus preventing the blade from breaking.
The nuts can be unscrewed and tightened up to 10 times without affecting the service life!

NOTE:
The torque required can be taken from the spare parts list of your particular unit.

9.3.3 Sharpening the blades

Only remove and smoothen any burrs!
Chips or deep grooves cannot be ground away. The blades must be replaced in these cases.

ATTENTION!
Only grind in the grinding area (see illustration)!
The sliding faces, in particular, must not be reground!

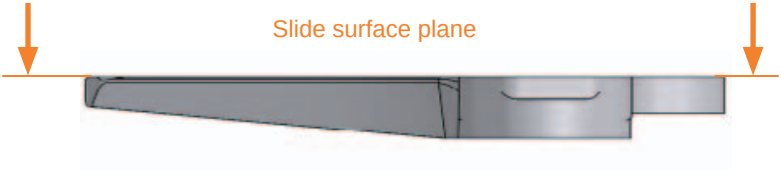


Tools required:

1. Use jaw protection on clamping device (e.g. vice) in order not to damage the blades
2. Grinder (e.g. angle grinder or belt grinder) with abrasive having a grain size of 80.

Procedure:

1. Clamp the blade securely into the clamping device so that it cannot move, but with the grinding area exposed.
2. Carefully grind the burr away evenly until you reach the sliding surface level. (see illustration)



In addition, when grinding, you must make sure that the inclination of the cutting surface in the direction of the blade arm movement is not changed. Check the incline and smoothness of the ground surface, using a suitable measuring tool.

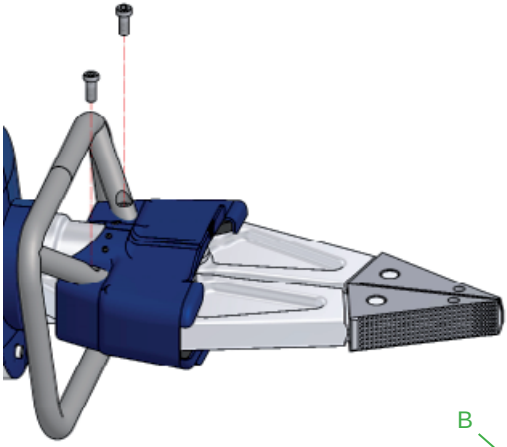
ATTENTION!
If you have not maintained the smoothness or incline, the proper operation of the blade is no longer guaranteed and the blades must be replaced.

9.3.4 Spreader arm, spreader tips, protective cover and handle exchange for the spreader

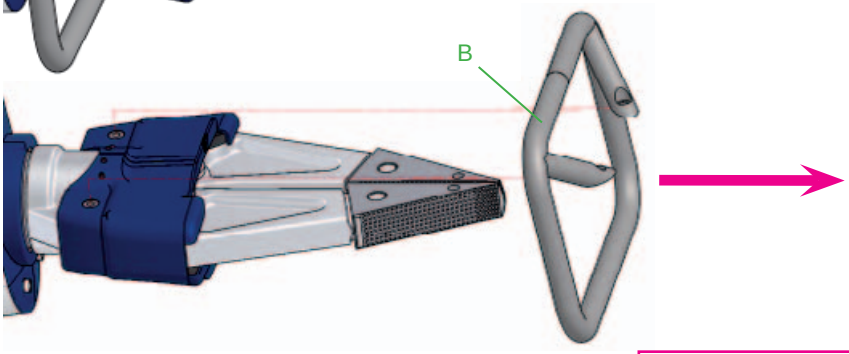
Components to be replaced	*Required work steps*
Handle	1., 2. and 8.
Plug-on tips	1., 5. and 8.
Protective cover	1. - 4. and 8.
Lever links	1. - 4., 6. and 8.
Spreader arms	1. - 6. and 8.

Work steps:

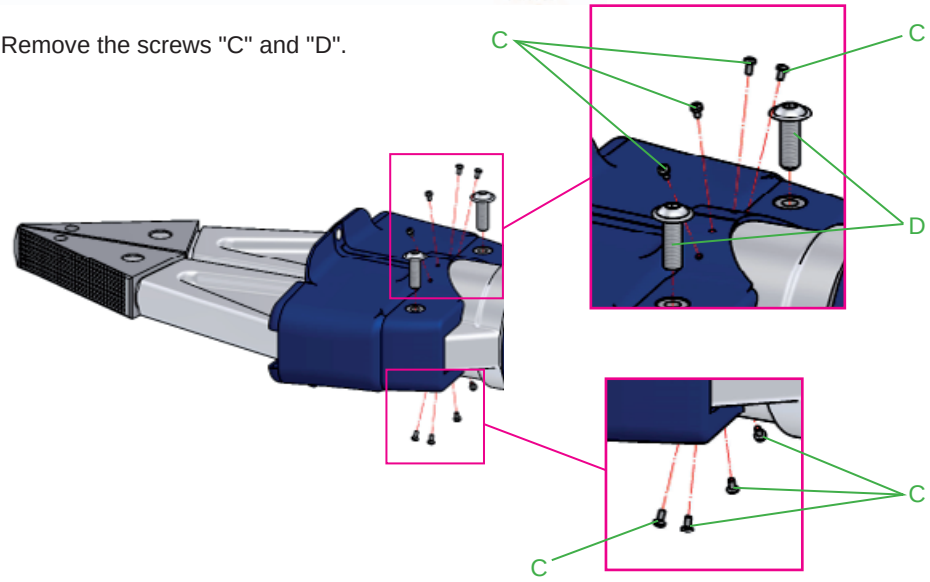
1. First of all, carefully clean the rescue equipment. Now switch off the device and remove the battery or unplug the power supply from the device.

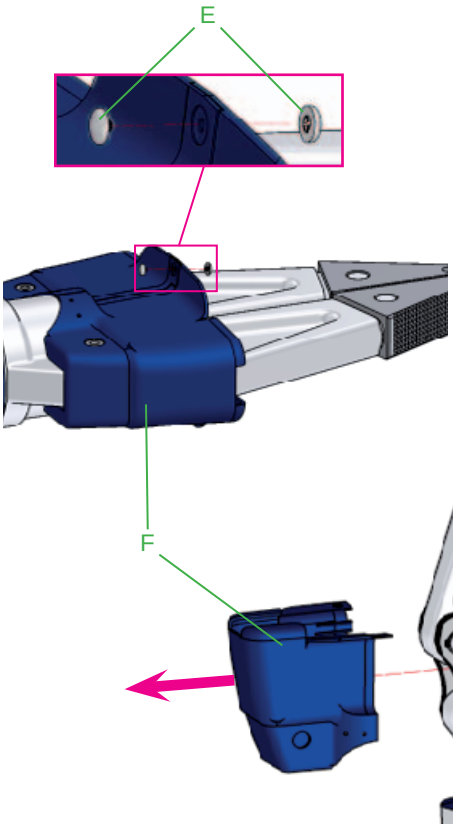


2. Remove the fixing screws "A" and remove the handle "B".



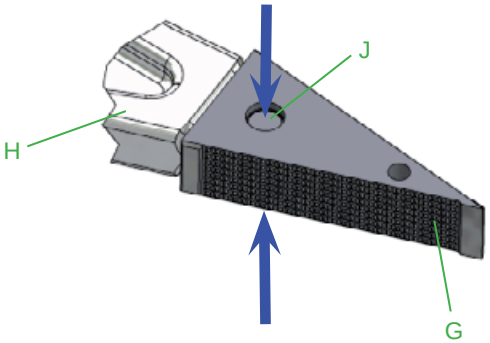
3. Remove the screws "C" and "D".

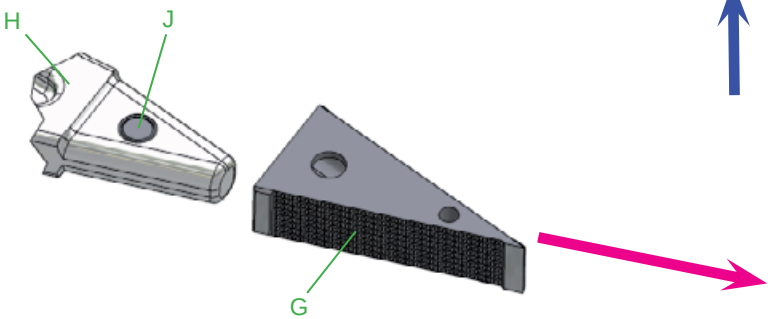




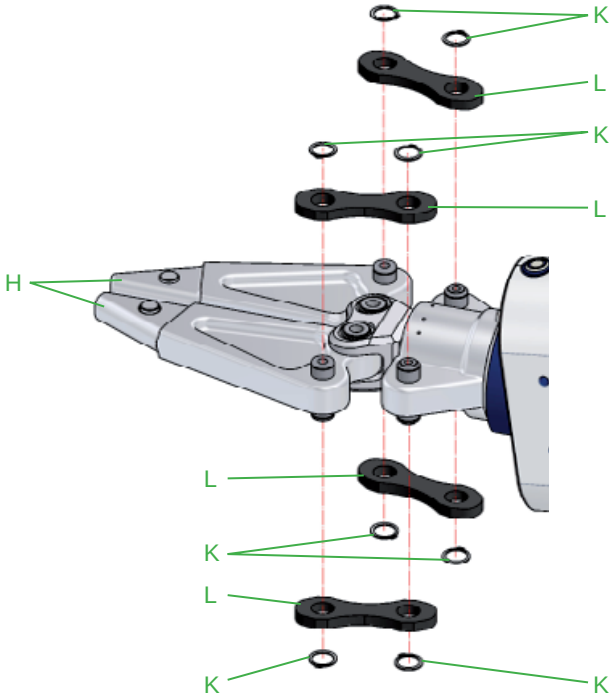
4. Remove the two two-piece locking elements "E" on the protective cover "F" and remove the two-piece protective cover by pulling it sideways.

5. In order to remove the plug-on tips "G", you must simultaneously press the buttons "J" on each side of a spreader arm "H" fully together and then pull the plug-on tip forwards off the spreader arm.

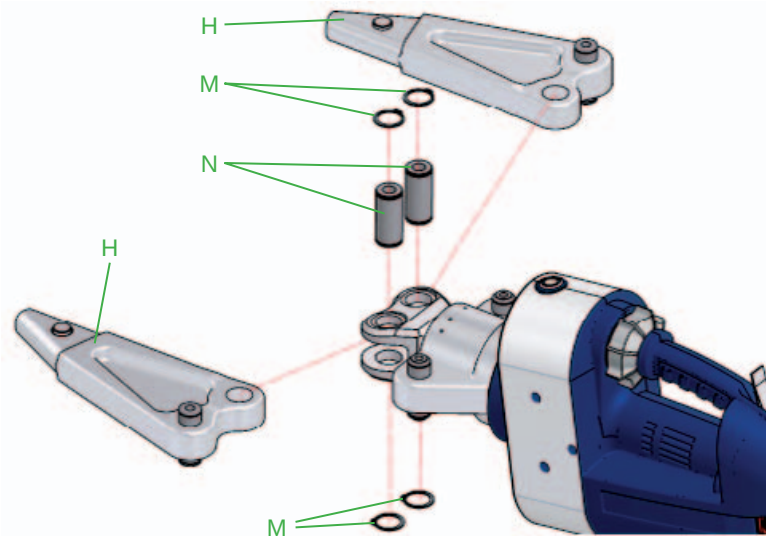




6. You need to remove the retaining rings "K" and the lever links "L" to replace the spreader arms "H".



7. Also remove the retaining rings "M" and remove the pins "N". You can then remove the spreader arms "H".



8. The work steps must be carried out in reverse order to fit the new parts.

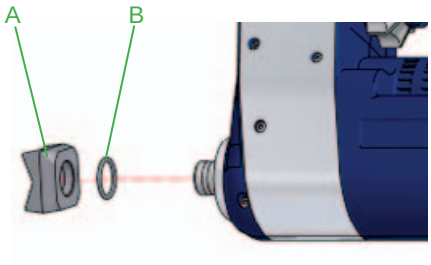
ATTENTION!
Don't forget to apply LUKAS special grease to all sliding surfaces.

NOTE:
The torque required can be taken from the spare parts list of your particular unit.

9.3.5 Rescue ram

Work steps for exchanging the cylinder piston claw:

1. First of all, carefully clean the rescue equipment. Now switch off the device and remove the battery or unplug the power supply from the device.

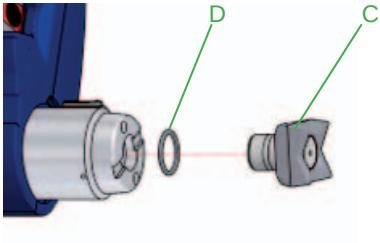


2. Pull the claw "A" off the cylinder piston and remove the O-ring "B". Where the O-ring is damaged, it must be replaced.

3. Insert the O-ring "B" into the groove of the new claw "A" provided and check it for a firm fit. Grease the contact surfaces with LUKAS special grease and thenslide the new claw onto the cylinder piston up to the limit stop.

Work steps for exchanging the cylinder base claw:

1. First of all, carefully clean the rescue equipment. Now switch off the device and remove the battery or unplug the power supply from the device.



2. Pull the claw "C" off the cylinder base and check whether the O-ring "D" in the cylinder base has been damaged; if yes, replace it.

3. Check the firm fit of the O-ring "D", grease the contact surfaces with LUKAS special grease and then slide the new claw "C" onto the cylinder base up to the stop.

9.3.6 Labels

All damaged and/or illegible labels (safety instructions, type plate, etc.) must be renewed.

Procedure:

1. Remove damaged and/or illegible labels.
2. Clean surfaces with industrial alcohol.
3. Affix new labels.

Take care to affix the labels in the correct positions. If you are no longer sure about this, then please contact your authorised LUKAS dealer or LUKAS itself.

10. Troubleshooting

Trouble	Control	Cause	Solution
Blades, spreader arms or cylinder pistons move slowly or jerkily when operated	Battery fully charged?	Battery flat	Charge battery
		Battery defective	Replace battery
		Air in the hydraulic system	Repair by authorised dealer, staff specially trained by LUKAS or directly by LUKAS
	Power supply cable connected?	Power supply not properly connected to the eDRAULIC device (not automatically locked).	Reinsert power supply into the connection slot.
		Power supply cable not properly connected to the external power supply.	Reconnect external power supply.
		Power supply or power supply cable defective.	Replace power supply or power supply cable.
		External power source defective.	Use other external power source
Blades, spreader arms or cylinder pistons do not move when operated.	Battery fully charged?	Battery flat	Charge battery
		Battery defective	Replace battery
	Power supply cable connected?	Power supply cable defective	Replace power supply cable
		Device defective	Repair by authorised dealer, staff specially trained by LUKAS or directly by LUKAS
Device doesn't perform at its given power		Device defective	Repair by authorised dealer, staff specially trained by LUKAS or directly by LUKAS

Trouble	Control	Cause	Solution
Following release, the star grip doesn't return to the central position	Casing damaged or star grip operation does not work smoothly?	Damage to the torsion spring for reset	Repair by authorised dealer, staff specially trained by LUKAS or directly by LUKAS
		Soiled valve or star grip	
		Defective valve	
		Other mechanical damage (e. g. star grip)	
Hydraulic fluid leaks on the piston rod		Defective rod seal	Repair by authorised dealer, staff specially trained by LUKAS or directly by LUKAS
		Damage to the piston	
The useful operating time between the individual charging cycles is less than 5 minutes, despite charging the batteries according to the instructions.		Battery defective	Replace battery

If you cannot rectify the malfunctions, inform an authorised LUKAS dealer or the LUKAS customer service department immediately!
The address of the LUKAS Customer Service Department is:

LUKAS Hydraulik GmbH

Weinstraße 39
91058 Erlangen
Germany

Tel.: (+49) 09131 / 698 - 348
Fax.: (+49) 09131 / 698 - 353

11. Technical data

Since all values are subject to tolerances, minor differences may occur between the data on your equipment and the data in the following tables.
The values may also differ because of reading inaccuracies and/or tolerances in the measuring equipment used.

NOTE:
The following tables contain only the technical data necessary for operation and storage.
Further information about your device is available directly from LUKAS.

11.1 eDRAULIC cutter

Type		**S 311 E**	**S 700 E**
Ref.no.		90-20-20 (172090000)	90-20-70 (172080000)
Dimensions (without battery) l x w x h	[mm]	860 x 225 x 290	925 x 300 x 290
	[in.]	*33.86 x 8.86 x 11.42*	*36.42 x 11.81 x 11.42*
Max. cutting opening	[mm]	150	185
	[in.]	*5.91*	*7.28*
Weight (excl. battery)	[kg]	19,4	24,5
	[lbs.]	*42.8*	*54.0*
Nominal electrical voltage (with power supply)	[V]	24	
Nominal electrical voltage (with lithium/ion battery)	[V]	25,2	
Protection category		IP44	
Classification (NFPA 1936)		A7/B8/C6/D7/E7	A8/B9/C8/D9/E9

11.2 eDRAULIC combi tool

Type		SC 250 E	SC 350 E
Ref.no.		90-30-10 (173000000, 173115000)	90-30-20 (173010000)
Dimensions (excl. battery) l x w x h	[mm]	870 x 215 x 295	908 x 225 x 290
	[in.]	*34.3 x 8.5 x 11.6*	*37.8 x 8.9 x 11.4*
Max. cutting opening	[mm]	233	265
	[in.]	*9.2*	*10.43*
Max. cutting force (rearmost cutting point)	[kN]	280	360
	[lbf.]	*62,944*	*80,928*
Maximum spreading force (at a distance of 25mm / 0.98in. from the tips)	[kN]	33	40
	[lbf.]	*7,418*	*8,991*
LSF spreading force (according to NFPA)	[kN]	23	24
	[lbf.]	*5,170*	*5,396*
HSF spreading force (according to NFPA)	[kN]	29	37
	[lbf.]	*6,519*	*8,318*
Max possible spreading force	[kN]	184	350
	[lbf.]	*41363*	*78,687*
Maximum spreading distance	[mm]	320	360
	[in.]	*12.6*	*14.17*
Maximum pulling force (on attachment hole for chain set)	[kN]	34	41
	[lbf.]	*7,643*	*9,218*
Pulling distance (on attachment hole for chain set)	[mm]	330	371
	[in.]	*13.0*	*14.6*
HPF pulling force (according to NFPA)	[kN]	37	49
	[lbf.]	*8,318*	*11,014*
LPF pulling force (according to NFPA)	[kN]	27	30
	[lbf.]	*6,070*	*6,744*
Weight (excl. battery)	[kg]	16,9	19,8
	[lbs.]	*37.3*	*43.7*
Nominal electrical voltage (with power supply)	[V]	24	24
Nominal electrical voltage (with lithium/ion battery)	[V]	25,2	25,2
Protection category		IP44	IP44
Classification (NFPA 1936)		A6/B6/C6/D7/E7	A6/B7/C7/D7/E7

11.3 eDRAULIC spreader

Type		SP 300 E
Ref.no.		90-10-15 (171050000)
Dimensions (excl. battery) l x w x h	[mm] *[in.]*	895 x 355 x 290 *35.2 x 14.0 x 11.4*
Maximum spreading force (at a distance of 25mm / 0.98in. from the tips)	[kN] *[lbf.]*	44 *9900*
Max. possible spreading force	[kN] *[lbf.]*	125 *28100*
LSF spreading force (according to NFPA)	[kN] *[lbf.]*	33 *7400*
HSF spreading force (according to NFPA)	[kN] *[lbf.]*	40 *9000*
Maximum spreading distance	[mm] *[in.]*	605 *23.8*
Maximum pulling force (on attachment hole for chain set)	[kN] *[lbf.]*	31 *7000*
Pulling distance (on attachment hole for chain set)	[mm] *[in.]*	475 *18.7*
HPF pulling force (according to NFPA)	[kN] *[lbf.]*	24 *5200*
LPF pulling force (according to NFPA)	[kN] *[lbf.]*	20 *4300*
Weight (excl. battery)	[kg] *[lbs.]*	21 *46.1*
Nominal electrical voltage (with power supply)	[V]	24
Nominal electrical voltage (with lithium/ion battery)	[V]	25,2
Protection category		IP44

11.4 eDRAULIC rescue ram

Type		R 411 E
Ref.no.		90-40-10 (174080000)
Length (retracted)	[mm] *[in.]*	545 *21.46*
Length (extended)	[mm] *[in.]*	905 *35.63*
Dimensions w x h	[mm] *[in.]*	150 x 265 *5.91 x 10.43*
Maximum piston extension	[mm] *[in.]*	360 *14.17*
Compressive force	[kN] *[lbf.]*	103 *23,156*
Weight (excl. battery)	[kg] *[lbs.]*	16,9 *37.3*
Nominal electrical voltage (with power supply)	[V]	24
Nominal electrical voltage (with lithium/ion battery)	[V]	25,2
Protection category		IP44

11.5 Noise emissions (based on the EN ISO 3744 standard)

11.5.1 S700E, S311E, SP300E, SC250E and SC350E:

Battery type used for device		Lithium / ion
No-load operation (measuring distance: 1m)	[dB(A)]	75
full load operation (measuring distance: 1m)	[dB(A)]	77
No-load operation (measuring distance: 5m)	[dB(A)]	67
full load operation (measuring distance: 5m)	[dB(A)]	69

11.5.2 R411E:

Battery type used for device		Lithium / ion
No-load operation (measuring distance: 1m)	[dB(A)]	78
full load operation (measuring distance: 1m)	[dB(A)]	79
No-load operation (measuring distance: 5m)	[dB(A)]	71
full load operation (measuring distance: 5m)	[dB(A)]	72

11.6 Operating and storage temperature ranges

Operating temperature	[°C] / *[°F]*	-20 … +55	*-4 … +131*
Ambient temperature (device in operation)	[°C] / *[°F]*	-25 … +45	*-13 … +113*
Storage temperature (device not in operation)	[°C] / *[°F]*	-30 … +60	*-22 … +140*

11.7 Oscillation / vibration

The total oscillation value / vibration value to which the upper limbs are exposed, is usually below 2.5 m/s².
Higher values may be measured for short periods as a result of interaction with the materials to be processed.

(The oscillations / vibrations were determined in accordance with DIN EN ISO 20643.)

11.8 Tightening torques for pivot bolts (cutters and combi tools only)

type		S 311 E	S 700 E	SC 250 E	SC 350 E
pivot bolt		M 24 x 1,5	M32 x 1,5	M 24 x 2	M 24 x 1,5
wrench size	[mm]	36	46	36	36
	[in.]	*1.42*	*1.81*	*1.42*	*1.42*
torque	[Nm]	120 +10	140 + 10	110 +10	120 +10
	[lbf.in.]	*1,062 + 89*	*1,239 + 89*	*890 + 89*	*1,062 + 89*

12. EC Declarations of conformity

LUKAS Hydraulik GmbH
Weinstrasse 39,
91058 Erlangen
Deutschland

Dinglee, LUKAS, Hurst, Vetter

IDEX Europe GmbH
Weinstraße 39
91 058 Erlangen
Germany

EG-Konformitätserklärung / *EC Declaration of Conformity*

Im Sinne der EG-Maschinenrichtlinie 2006/42/EG, Anhang II A
In accordance with the EC Machinery Directive 2006/42/EC, Appendix II A

Hiermit erklären wir, dass die nachfolgend bezeichneten eDRAULIC Geräte
We hereby declare that the following eDRAULIC tools

Artikelnr. / Item no.	Modell / Type
90-10-15	SP 300 E
90-20-20	S 311 E
90-20-70	S 700 E
90-30-20	SC 350 E
90-40-10	R 411 E
90-30-10	SC 250 E

- in der von uns gelieferten Ausführung den Bestimmungen der Maschinenrichtlinie 2006/42/EG (ersetzte Richtlinie 98/37/EG) und den sie umsetzenden nationalen Rechtsvorschriften entsprechen.
  Berücksichtigt wurden insbesondere die Normen:
  - DIN EN ISO 12100:2010, Ausgabe: 2011-03 - Sicherheit von Maschinen – Allgemeine Gestaltungsleitsätze – Risikobeurteilung und Risikominderung

- *in the versions supplied by us conform to the EC Machinery Directive 2006/42/EC (replaced directive 98/37/EC) and the national statutory provisions that implement them.*
  The following standards have particularly been taken into consideration:
  - *DIN EN ISO 12100:2010, publication date: 2011-03 – Safety of machinery - General principles for design*
  - *- Risk assessment and risk reduction*

Bei einer nicht mit uns abgestimmten Änderung oder Verwendung der Maschine/Ausrüstung verliert diese Erklärung ihre Gültigkeit.
This declaration loses its validity in the case of alterations or usage of the machinery/equipment not approved by LUKAS.

i.V. C. Sauerbier
Carsten Sauerbier
Director of Technical Innovation and Development
IDEX Europe GmbH

Dietmar Lindner
Konstrukteur / *Engineering Designer*
LUKAS Hydraulik GmbH

Erlangen, 06.03.2013

Seite/Page 1 von/of 1

13. Accessories

13.1 Batteries

Only LUKAS lithium-ion rechargeable batteries may be used to operate eDRAULIC tools. These guarantee optimum performance and maximise the operating time of eDRAULIC tools.

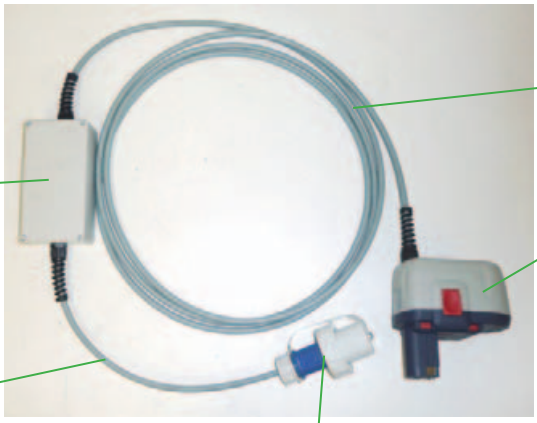
13.2 Battery charger

Only the "eDRAULIC Power Pack Charger" may be used for the lithium/ion batteries.

NOTE:
Pay strict attention to the separate operating instructions for the battery charger.

13.3 Power supply

The eDRAULIC devices have a unique power supply with integrated electronics, allowing the devices to be operated for an almost unlimited time by connecting them to an external power source. The power supply converts the voltage of the external power source in such a way that it may be used instead of a battery.



Structure:

There is an adapter on one side of the power supply which can be simply inserted into the connection slot of the devices and locked. The other side has a mains plug. Both are connected by a cable. The mains plug is a Schuko plug with Protection Classification IP68. The integrated filter is appropriate for the conversion of AC voltage to DC voltage.

NOTE:
Pay strict attention to the separate operating instructions for the power supply.

13.4 Extension for rescue ram

A special extension is available for the eDRAULIC rescue ram, which may be used to enlarge the effectively possible opening width of an object.
The installation instructions for the extension may be taken from the chapter on "Squeezing (rescue ram)".

Type		**Extension**
Ref.no.		174081000
Dimensions including claw l x w x h	[mm] *[in.]*	360 x 55 x 55 *14.17 x 2.17 x 2.17*
Maximum extension possible	[mm] *[in.]*	300 *11.81*
Weight	[kg] *[lbs.]*	4,2 *9.3*

13.5 Chain sets

Chain sets are required in order to be able to perform pulling operations with the eDRAULIC spreader and the eDRAULIC combi-tool (see chapter, "Pulling").

Suitable chain sets:

for SC250E: KSV 8/50
for SC350E: KSV 8/50
for SP300E: KSV 11

NOTE:
The safety information, assembly, use and technical data for the chain sets can be found in the separately supplied operating instructions for the particular chain set.

14. Instructions regarding disposal

Please properly dispose of all packing materials and removed parts.

Electrical equipment, accessories and packaging should always be disposed of in an environmentally compatible way.

Only for EU countries:
Do not dispose of electrical equipment with your household waste!
According to the European Directive 2002/96/EC governing electrical and electronic waste and their application in national legislation, old electrical equipment must be separately collected and recycled in an environmentally compatible manner.

Please also take into account the notes in the separate operating instructions for the batteries.

15. Notes

LUKAS Hydraulik GmbH
A unit of the IDEX Corporation

Weinstraße 39, Erlangen, 91058 Germany
Tel.: (+49) 0 91 31 / 698 - 0
Fax.: (+49) 0 91 31 / 698 - 394
e-mail: lukas.info@idexcorp.com
www.lukas.com

MADE IN GERMANY

Subject to revision

© Copyright 2013 LUKAS Hydraulik GmbH